TRUE ROBOTICS

INTRODUCTION TO ROBOTICS WITH AXLE

GRADES 6–8

This document lists the Arkansas learning standards addressed by Introduction to Robotics with Axle, True Robotics' grades 6–8 robotics curriculum. Standards are grouped by subject and grade level, with codes and wording as published by the Arkansas Division of Elementary & Secondary Education.

40	13	9	62
MATH	SCIENCE	CS	TOTAL STANDARDS

MATHEMATICS

40 STANDARDS

Based on the Arkansas state standards

GRADE	CODE	STANDARD
6	6.NCC.6	Interpret and represent quotients of fractions.
6	6.NCC.7	Solve problems involving the division of fractions in real-world and mathematical problems.
6	6.ALG.1	Read and write expressions in real-world or mathematical problems in which letters stand for numbers.
6	6.ALG.6	Use substitution to determine if a given value in a specified set makes an equation or inequality true.
6	6.ALG.7	Write and solve one-step equations in real-world and mathematical problems, involving positive rational numbers and zero.
6	6.GM.1	Find the area of triangles, quadrilaterals, and polygons by composing or decomposing to solve real-world and mathematical problems.
6	6.GM.2	Apply the formulas V = lwh and V = Bh to find the volume of right rectangular prisms with fractional edge lengths to solve real-world and mathematical problems, including solving for an unknown dimension.
6	6.GM.3	Construct nets of a rectangular prism, rectangular pyramid, triangular prism, and triangular pyramid, using the nets to find the surface area of these prisms.
6	6.GM.4	Find and graph pairs of rational numbers in all four quadrants of the coordinate plane in real-world and mathematical problems.
6	6.GM.6	Use coordinates to calculate vertical and horizontal distances between points with the same x-coordinate or the same y-coordinate to solve real-world and mathematical problems.

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GRADE	CODE	STANDARD
6	6.SP.1	Identify the difference between statistical and non-statistical questions and write simple statistical questions that allow variable responses.
6	6.SP.2	Calculate and interpret any measure of center (mean, median, and mode) of a numerical data set.
6	6.SP.5	Calculate and interpret the measure of variation [range and interquartile range (IQR)] of a numerical data set.
7	7.NCC.3	Demonstrate in real-world contexts the distance between two rational numbers on the number line as the absolute value of their differences.
7	7.NCC.6	Apply properties of operations as strategies to fluently add, subtract, multiply, and divide rational numbers.
7	7.NCC.7	Use addition and subtraction with rational numbers in any form to solve multi-step problems in real-world and mathematical contexts.
7	7.NCC.8	Use multiplication and division with rational numbers in any form to solve multi-step problems in real-world and mathematical contexts.
7	7.PR.1	Determine the unit rate (constant of proportionality) from tables, graphs, equations, diagrams, or verbal descriptions of proportional relationships.
7	7.PR.2	Calculate unit rates in real-world contexts that include complex fractions.
7	7.PR.3	Solve multi-step ratio and percent problems in a real-world context, including percent error and percent increase and decrease.
7	7.PR.5	Compare two different proportional relationships represented in different forms.
7	7.PR.6	Create equations in the form of y = mx from tables, verbal descriptions, or graphs.
7	7.PR.7	Given a graph with a proportional relationship, explain the meaning of a point (x, y) on the graph, including the origin (0, 0) and the unit rate (1, r).
7	7.ALG.2	Model and solve fluently two-step equations in real-world or mathematical problems.
7	7.ALG.4	Write an equation to express two quantities in terms of the dependent and independent variables.
7	7.ALG.5	Describe the relationship between the dependent and independent variables in an equation using tables and graphs, relating these to the equation.
7	7.GM.1	Describe the proportional relationship between the circumference and diameter of a circle.
7	7.GM.2	Use area and circumference formulas of a circle to solve real-world and mathematical problems.
7	7.GM.3	Apply the formulas for the volume and surface area of right rectangular prisms, rectangular pyramids, triangular prisms, and triangular pyramids to solve real-world and mathematical problems.
7	7.GM.6	Calculate the scale factor, compute the actual lengths from the scale in a drawing, and reproduce a scale drawing using another scale.
8	8.NCC.1	Describe relationships in the real number system (rational and irrational).
8	8.NCC.2	Compare the size of irrational numbers and locate them on a number line by finding the rational approximations.

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GRADE	CODE	STANDARD
8	8.FN.1	Graph proportional relationships, interpreting the unit rate as the slope of the graph.
8	8.FN.5	Distinguish between linear and nonlinear functions by comparing graphs and equations.
8	8.FN.6	Determine the rate of change (slope) and y-intercept (initial value) from tables, graphs, equations, and verbal descriptions of linear relationships.
8	8.FN.7	Interpret and explain the meaning of the rate of change (slope) and y-intercept (initial value) of a linear relationship in a real-world context.
8	8.ALG.3	Analyze and solve systems of linear equations in the form y = mx + b in real-world or mathematical contexts, graphically and algebraically.
8	8.GM.1	Apply the formulas for the volume and surface area of cylinders, cones, and spheres to solve real-world and mathematical problems.
8	8.GM.4	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles.
8	8.GM.5	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

SCIENCE

13 STANDARDS

Based on the Arkansas state standards

GRADE	CODE	STANDARD
6	6-LS1-3	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
6	6-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
6	6-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
7	7-PS1-4	Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
7	7-LS2-3	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
7	7-LS2-4	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
8	8-PS4-1	Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
8	8-PS4-2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
8	8-PS4-3	Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.

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GRADE	CODE	STANDARD
8	8-PS2-1	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
8	8-PS2-2	Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
8	8-PS3-1	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
8	8-LS4-5	Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

COMPUTER SCIENCE

9 STANDARDS

Based on the Arkansas state standards

GRADE	CODE	STANDARD
6–7	2.3.2	Use nested conditional statements, boolean operators, and random number generation when programming.
6	2.1.3	Create a solution for a complex problem that includes multiple subtasks.
7	2.2.2	Use debugging tools (e.g., code tracing, ducky debug, pair programming) when coding.
7	4.3.1	Research and discuss emerging technologies and their potential impact.
7	4.3.2	Explain how packets are transmitted and received using protocols.
8	2.1.1	Implement algorithms that leverage iteration(loops) to solve computational problems.
8	2.1.2	Design clear procedures, incorporating iteration and conditional logic to solve a complex problem.
8	2.2.1	Evaluate the efficiency of algorithms.
8	4.1.3	Identify other computing devices used around the home and community (e.g., IoT devices, traffic sensors, cell phone towers, automated doors, solar-sensitive streetlights).

SOURCES & NOTES

- The official mathematics, science and computer science standards for Arkansas, as published by the Arkansas Division of Elementary & Secondary Education.
- Codes and standard wording are reproduced from the official standards documents. Clarification statements, examples and assessment boundaries are omitted.
- Grade shows the grade level at which True Robotics lessons address each standard. A range (for example K–2) marks a standard written for a grade band.
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- A lesson-level crosswalk is available on request at info@truerobotics.org.

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